

# WATER AND SEDIMENT CONTROL BASIN

(No.)  
Code 638

Natural Resources Conservation Service  
Conservation Practice Standard

## I. Definition

An earth embankment or a combination ridge and channel generally constructed across the slope and minor watercourse to form a sediment trap and a water detention basin.

## II. Purpose

To improve farmability of sloping land, reduce watercourse and gully erosion, trap sediment, reduce and manage onsite and downstream runoff, and improve downstream water quality.

## III. Conditions Where Practice Applies

This standard applies to planning, designing, and constructing water and sediment control basins in a rural setting. It does not apply to Natural Resources Conservation Service (NRCS) Field Office Technical Guide (FOTG), Section IV, Standards for Diversion (362), Grade Stabilization Structure (410), or Sediment Basin (350).

This practice applies to sites where:

- The topography is generally irregular.
- Watercourse and gully erosion is a problem.
- Sheet and rill erosion is controlled by other conservation practices.
- Runoff and sediment damage land and improvements.
- Soil and site conditions are suitable.
- Adequate outlets are available or can be provided.
- The 10-year, 24-hour runoff is less than 10 acre-feet and the *effective height*<sup>1</sup> of the embankment is 15 feet or less or the 10-year, 24-hour runoff is less than 15 acre-feet and the effective height of the embankment is 10 feet or less.

## IV. Federal, State, and Local Laws

Water and sediment control basin structures shall comply with all federal, state and local laws, rules or regulations. The owner and/or operator is responsible for securing required permits. Permitting authorities should be contacted during the planning phase of the project. This standard does not contain the text of the federal, state, or local laws.

## V. Criteria

### A. Design criteria

Water and sediment control basins can be part of the treatment needed to protect the soil resource base. Additional practices such as terraces, contouring, a conservation cropping system, conservation tillage, and crop residue management shall also be used to control erosion.

Water and sediment control basins shall not be used in place of terraces. When a ridge and channel extend beyond the detention basin or level embankment, terraces shall be designed. The resource management system must reduce soil loss in the interval above and below the basin to prevent excessive maintenance and operation problems.

### 1. Spacing

Water and sediment control basins shall generally be spaced at terrace intervals. The grade of the watercourse between basins shall be considered, and the spacing shall be set to prevent watercourse or gully erosion. The basin shall be designed to limit the duration of water impoundment so as not to damage crops or create other problems.

The system of basins and row arrangements shall be parallel when possible and spaced to accommodate farm machinery widths. Consideration shall be given to embankment slope lengths, top width, and inlet location when determining spacing.

## 2. Alignment

The embankment orientation and row direction shall be approximately perpendicular to the land slope to permit contouring as near as possible. The arrangement should permit farmability without excessive short point rows or sharp curves. Field boundaries and row length should also be considered when determining basin location and row direction.

## 3. Cross section

The *constructed elevation* of the embankment shall be at least 5 % greater than the *design fill height* to allow for settlement. The maximum design fill height shall be 15 feet.

<u>Design fill height (ft)</u>	<u>Top width (ft)</u>
Less than 10	6
10-15	8

The combined upstream and downstream side slopes of the settled embankments shall not be less than 5 horizontal to 1 vertical, and neither slope shall be steeper than 2 horizontal to 1 vertical. The minimum top width shall be as shown in the following.

Slopes to be cropped shall be 4 horizontal to 1 vertical or flatter.

## 4. Capacity

The minimum basin design capacity shall be large enough to control the runoff from a 10-year frequency, 24-hour duration storm without overtopping. The basin shall also have the capacity to store 10 years of sediment accumulation unless provisions are made for periodic sediment removal from the basin to maintain the design capacity.

The basin shall have the ends closed to the *design elevation*. A maximum of 1 foot of *freeboard* may be added to the design fill height to provide for an *auxiliary spillway*

around one or both ends of the basin. The auxiliary spillway must not contribute runoff to a lower basin that does not have an auxiliary spillway.

## 5. Foundation preparation

The area under the embankment shall be cleared of all sod, roots, vegetation, organic matter, and other undesirable materials.

## 6. Outlets

Water and sediment control basins shall have underground outlets or soil infiltration outlets that meet the requirements of NRCS FOTG, Section IV, Standards for Terrace (600) and Underground Outlet (620).

## 7. Vegetation

Slopes and disturbed areas that are not to be farmed shall be established to suitable erosion-resistant vegetation.

Environmental quality and wildlife food and habitat shall be considered in selecting the species of vegetation. Seedbed preparation, fertilizing, seeding, and mulching shall be in accordance with NRCS FOTG, Section IV, Standards for Critical Area Planting (342) and Mulching (484).

# VI. Operation and Maintenance

An operation and maintenance plan or maintenance plan is required for this practice. The maintenance plans for the water and sediment control basin shall include maintenance requirements for the embankment, design capacity, sediment removal, vegetative cover, and the outlet. Maintenance shall include inspection of inlets for clogging and embankment failure after each large storm. Failures must be corrected as soon as possible to prevent major damages.

The sediment and design capacity shall be maintained by cleaning the basin. Excavated material spread on the cropland shall be placed to maintain fertility and enhance topography. The vegetation shall be maintained to prevent sheet and rill erosion or gully erosion of the embankment. Trees and woody cover on embankments shall be removed.

## VII. Considerations

Additional recommendations relating to design that may enhance the use of, or avoid problems with, this practice, but are not required to ensure its basic conservation functions are as follows:

### A. Water Quantity

1. Effect on the water budget, especially on volumes and rates of runoff, infiltration, and evaporation.
2. Ability to increase deep percolation below the root zone and, where possible, ground water recharge.
3. Potential for a change in rates of plant growth and transpiration because of changes in the amount of soil water storage.
4. Effects on the trapping or distribution of snow.

### B. Water Quality

1. Potential to trap sediment and sediment attached substances carried by runoff.
2. Potential change in the flow of dissolved substance such as nitrates or pesticides into downstream water courses.
3. Potential movement of dissolved substances to ground water
4. Effect on downstream water temperature.
5. Effects on the visual quality of downstream water resources.

## VIII. Design Documentation, Plans and Specifications

Plans and specifications for installing water and sediment control basins shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

### A. Design Documentation Requirements

Location and site map, soils, drainage area and volume computations including sediment volume required, design cross sections, spacing, and outlet requirements.

### B. Plans and Specifications

Location map, profile along centerline of structure, cross section, outlet diameter, length, material, elevations, and seeding requirements.

### C. As-Built Documentation

Completed cross section of structure at locations most likely to not meet design; profile along centerline of structure; outlet diameter, length, material, manufacturer, location, and elevations; vegetation adequacy.

## IX. References

USDA NRCS documents may be obtained by contacting:

- National Technical Information Service  
U.S. Department of Commerce  
5385 Port Royal Road  
Springfield, VA 22151  
(703) 487-4650
- Superintendent of Documents  
U.S. Government Printing Office  
Washington, D.C. 20401  
National NRCS Home Page  
[www.nrcs.usda.gov](http://www.nrcs.usda.gov)
- Wisconsin NRCS Home Page  
[www.wi.nrcs.usda.gov](http://www.wi.nrcs.usda.gov)

United States Department of Agriculture, Natural Resources Conservation Service, National Engineering Handbook, Part 650, Engineering Field Handbook, Chapter 2 (Estimating Runoff).

United States Department of Agriculture, Natural Resources Conservation Service, Wisconsin Field Office Technical Guide, Section IV (Conservation Practice Standards).

United States Department of Agriculture, Natural Resources Conservation Service, Technical Release 55, Urban Hydrology for Small Watersheds (TR-55).

## X. Definitions

*Auxiliary spillway* (V.A.4.) – The auxiliary spillway is the spillway designed to convey excess water through, over, or around a dam. This has been commonly referred to as an “emergency spillway”.

*Constructed elevation* (V.A.3.) – The sum of the design elevation and the allowance for settlement.

*Design elevation* (V.A.4.) – Design elevation is the required top elevation of the embankment along the centerline before allowance for settlement has been added.

*Design fill height* (V.A.3.) – The difference in elevation between the design elevation and foundation elevation after stripping along the centerline of embankment.

*Effective height* (III.) – The effective height of the dam is the difference in elevation, in feet, between the auxiliary spillway crest and the lowest point in the cross section along the centerline of the dam prior to stripping. If there is no auxiliary spillway, the design elevation for the top of the dam is the upper limit.

*Freeboard* (V.A.4.) – Freeboard is the additional depth or elevation required above computed design requirements.